

Optimizing for an arbitrary perfect entangler. I. Functionals

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Optimal control theory is a powerful tool for improving figures of merit in quantum information tasks. Finding the solution to any optimal control problem via numerical optimization depends crucially on the choice of the optimization functional. Here, we derive a functional that targets the full set of two-qubit perfect entanglers, gates capable of creating a maximally entangled state out of some initial product state. The functional depends on easily computable local invariants and unequivocally determines whether a gate is a perfect entangler. Optimization with our functional is most useful if the two-qubit dynamics allows for the implementation of more than one perfect entangler. We discuss the reachable set of perfect entanglers for a generic Hamiltonian that corresponds to several quantum information platforms of current interest.

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